REMARKS

Claims 1-25 are pending in this application.

Claims 1-25 have been rejected.

Claims 7, 16 and 24 have been amended herein.

Claims 1-25 remain pending in this application.

Reconsideration of the claims is respectfully requested. The Applicant makes the aforementioned amendments and subsequent arguments to place this application in condition for allowance. Alternatively, the Applicant makes these amendments and offers these arguments to properly frame the issues for appeal.

CLAIM REJECTIONS -- 35 U.S.C. § 103

Claims 1, 7-10, 16-18 and 24-25 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,719,344 to *Pawate* ("Pawate 1") in view of U.S. Patent No. 5,641,927 to *Pawate* ("Pawate 2"). Claims 2-6, 11-15 and 19-23 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Pawate 1 and Pawate 2, in view of U.S. Patent No. 5,565,639 to *Bae* (hereinafter "Bae"). The Applicant respectfully traverses the rejections.

In *ex parte* examination of patent applications, the Patent Office bears the burden of establishing a *prima facie* case of obviousness. MPEP § 2142, p. 2100-127 (8th ed. rev. 8 July 2010). Absent such a *prima facie* case, the applicant is under no obligation to produce evidence of nonobviousness. Id.

To establish a *prima facie* case of obviousness, three basic criteria must be met: First, there must be some reason – such as a suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art – to modify the reference or to

combine reference teachings. MPEP § 2142, pp. 2100-127 to 2100-128 (8th ed. rev. 8 July 2010); MPEP § 2143, pp. 2100-128 to 2100-139; MPEP § 2143.01, pp. 2100-139 to 2100-141. Second, there must be a reasonable expectation of success. MPEP § 2143.02, pp. 2100-141 to 2100-142 (8th ed. rev. 8 July 2010). Finally, the prior art reference (or references when combined) must teach or suggest all of the claim limitations. MPEP § 2143.02, pp. 2100-141 to 2100-142 (8th ed. rev. 8 July 2010).

Claim 1 recites:

> 1. An apparatus, comprising:
> a cross correlator operable to receive a first audio signal and a second audio signal, the cross correlator also operable to cross correlate a first time period of the first audio signal with a second time period of the second audio signal to produce a cross-correlated signal, where the second time period is larger than the first time period;
> at least one parameter identifier operable to receive the cross-correlated signal and identify a plurality of parameters associated with at least one of the first and second audio signals using the cross-correlated signal; and
> a score generator operable to receive the plurality of parameters and generate an indicator identifying an extent to which the first and second audio signals match.

That is, the apparatus includes a cross correlator and a parameter identifier, where the parameter identifier is operable to receive a cross-correlated signal and identify a plurality of parameters. A score indicator receives the plurality of parameters and generates a match indicator. Furthermore, the cross correlator cross correlates a first time period of a first audio signal with a larger second time period of a second audio signal.

The rejection of Claim 1 is improper for at least three reasons. First, Pawate 1 and the other cited references do not describe a cross correlator and a parameter identifier, where the parameter identifier is operable to receive a cross-correlated signal and identify a plurality of parameters. Second, Pawate 2 and the other cited references do not describe cross-correlating a first time period of a first audio signal with a larger second time period of a second audio signal. Third, Pawate 1 and

the other cited references do not describe a score indicator that receives a plurality of parameters and generates a match indicator.

The rejection of Claim 1 is improper, first, because Pawate 1 does not describe a cross correlator and a parameter identifier, where the parameter identifier is operable to receive a cross-correlated signal and identify a plurality of parameters, as asserted in the Final Office Action mailed November 12, 2010, ("the Office Action") page 3, lines 12-19. Furthermore, the Office Action does not rely on either Pawate 2 or Bae as teaching these elements of Claim 1.

With reference to Figure 2, Pawate 1 describes a Karaoke scoring system 20 with a feature extractor 29 that produces a feature vector from a reference signal, as well as a feature extractor 19 that produces a feature vector from a test signal. Each feature extractor extracts from its input signal one or more features, such as frame energy, pitch, zero crossing rate or filter bank amplitude; the one or more features are then combined to form a feature vector. *See Pawate 1, column 2, lines 39-43.* A similarity measure 33 is computed between the two feature vectors by comparing, for example, the frame energy of the reference signal to the frame energy of the test signal, and the pitch of the reference signal to the pitch of the test signal, followed by combining the comparisons into a single similarity measure. *See Pawate 1, col. 2, lines 43-53.* Thus, on a feature by feature basis, the similarity measure 33 produces a single similarity measure by comparing features of the test and reference signals received from the feature extractors 19 and 29.

The Office Action asserted that the similarity measure (Fig. 2, 33, of Pawate 1) describes both the cross correlator and the parameter identifier of Claim 1. This is clearly improper. The cross correlator of Claim 1 produces a cross-correlated signal from first and second audio signals, and from that cross correlated signal the parameter identifier of Claim 1 identifies a plurality of parameters. In contrast, the similarity measure of Pawate 1 receives one or more features of a

reference signal and one or more corresponding features of a test signal and produces a single measure of the similarity of the two signals. Pawate 1 and the other cited references do not teach, suggest, or even hint at a parameter identifier that identifies from its single similarity measure a plurality of parameters.

The Office Action further states:

> Though the Pawate and Pawate2 et al references fail to disclose the parameter identifier being different from and the cross correlator, it would have been the designer's preference to make the similarity measure of Pawate in two separate devices such that the first device correlates the multiple signals and the second device measures how much similarity is between the two signals for the purpose of making the system dynamic. *Office Action mailed November 12, 2010, page 4, lines 9-14.*

The comment is not directed to the language of Claim 1. Claim 1 recites a cross correlator and a parameter identifier, where the parameter identifier is operable to receive the cross-correlated signal and identify a plurality of parameters. The Office Action suggests making Pawate's similarity measure as two devices, where the second device "measures how much similarity is between the two signals." Such a device is not a parameter identifier operable to receive a cross-correlated signal and identify a plurality of parameters, as recited in Claim 1.

The rejection of Claim 1 is improper, second, because Pawate 2 does not describe cross-correlating a first time period of a first audio signal with a larger second time period of a second audio signal, as asserted in the Office Action, page 3, line 24, through page 4, line 5. Furthermore, the Office Action acknowledges that Pawate 1 does not describe this limitation and does not rely on Bae as teaching this element of Claim 1.

Pawate 2 describes a Karaoke apparatus that automatically adjusts the key of the background music based on a measurement of the key of a singer using the apparatus. *See Pawate 2, col. 2, lines 10-14.* One challenge in such an apparatus is to change the pitch of the signal without changing the

signal's duration. *See Pawate 2, col. 3, lines 38-40.* One technique for pitch shifting may be referred to as "direct resampling followed by time-scale modification." *See Pawate 2, col. 3, lines 57-65.* Direct resampling comprises either decimating (for raising the pitch) or interpolating (for lowering the pitch) the original signal, but results in a corresponding change in the duration of the altered signal. *See Pawate 2, col. 4, lines 13-20.* Time scale modification of the pitch-altered signal is then obtained through "synchronized overlap and add" (SOLA). *See Pawate 2, col. 4, lines 31-32.* SOLA achieves synchronization by concatenating two adjacent frames at regions of highest similarity, which are identified by finding a maximum value of a cross-correlation function between two adjacent frames over a specified range. *See Pawate 2, col. 4, lines 31-36.*

However, Pawate 2 does not describe cross-correlating a first time period of a first audio signal with a larger second time period of a second audio signal. Instead, Pawate 2 describes cross-correlating adjacent frames of one pitch-altered signal to change its duration. *See Pawate 2, col. 4, lines 21-25.* Furthermore, Pawate 2 provides an extensive discussion of selecting a single frame size for applying SOLA, based upon the pitch period of the signal, but provides no discussion of differing frame sizes. *See Pawate 2, col. 4, lines 37-46.* Therefore, Pawate 2 and the other cited references do not describe cross-correlating a first time period of a first audio signal with a larger second time period of a second audio signal.

The rejection of Claim 1 is improper, third, because Pawate 1 does not describe a score generator that generates a match indicator from a plurality of parameters that are identified from a cross-correlated signal as asserted in the Office Action, page 3, lines 20-22. Furthermore, the Office Action does not rely on either Pawate 2 or Bae as teaching this element of Claim 1.

As described above, Pawate 1 teaches a similarity measure that produces, for each frame of a song, a single value representing a similarity between a test signal and a reference signal. *See*

Pawate 1, col. 2, lines 43-57. A score is then accumulated from the similarity measures of all frames of a song. *See Pawate 1, col. 2, lines 57-60.* As such, even if the output of Pawate's similarity measure is interpreted as a cross-correlated signal (which the Applicant does not admit), Pawate's score is accumulated directly from the cross-correlated signal, rather than from parameters identified from the cross-correlated signal. Therefore, Pawate 1 and the other cited references do not describe a score generator that generates a match indicator from a plurality of parameters that are identified from a cross-correlated signal.

As such, Pawate 1 and Pawate 2, alone or in combination, do not describe all the limitations of Claim 1. The Applicant submits that Bae does nothing to overcome the shortcomings of Pawate 1 and Pawate 2. For at least these reasons, Claim 1 and its dependent claims are patentable over the cited references. For similar reasons, Claims 10 and 18 and their dependent claims also are patentable over the cited references. Accordingly, the Applicants respectfully request that the Examiner withdraw the § 103 rejections with respect to Claims 1-25.

CONCLUSION

As a result of the foregoing, the Applicant asserts that the remaining Claims in the Application are in condition for allowance, and respectfully requests an early allowance of such Claims.

If any issues arise, or if the Examiner has any suggestions for expediting allowance of this Application, the Applicant respectfully invites the Examiner to contact the undersigned at the telephone number indicated below or at ***wmunck@munckcarter.com***.

The Commissioner is hereby authorized to charge any additional fees connected with this communication or credit any overpayment to Deposit Account No. 50-0208.

Respectfully submitted,

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